

ACCESSION #: 9910080124

NON-PUBLIC?: N

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Beaver Valley Power Station Unit 1 PAGE: 1 OF 5

DOCKET NUMBER: 05000334

TITLE: Beaver Valley Power Station Unit No. 1 Manual Reactor

Trip Due to Main Unit Generator Voltage Regulator

Malfunction

EVENT DATE: 09/06/99 LER #: 99-010-00 REPORT DATE: 10/01/99

OTHER FACILITIES INVOLVED: None DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100%

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: R. D. Hart, Senior Licensing TELEPHONE: (412) 393-5284

Supervisor

COMPONENT FAILURE DESCRIPTION:

CAUSE: X SYSTEM: TL COMPONENT: RG MANUFACTURER: West.

REPORTABLE EPIX: Y

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On September 6, 1999 with the Beaver Valley Power Station (BVPS) Unit No. 1 running at 100% power, the following four alarms were received at 1722: Generator Field Forcing, Generator Field Overcurrent, Voltage Regulator Firing Circuit #1 Blown

Fuse/Power Loss, and Voltage Regulator Firing Circuit #2 Blown Fuse/Power Loss. Control room operators observed the main generator power factor, VAR and current meters to be fluctuating rapidly above and below normal values. The above four alarms then cleared and reoccurred within approximately two seconds. These alarms continued to clear and reoccur on an approximate two second frequency. The reactor was manually tripped 18 seconds after the receipt of the initial alarm. The control room operators followed station procedures to recover from a (manual) reactor trip. Safety related systems functioned properly following the reactor/turbine trip and the Unit was stabilized in hot standby conditions. This is an event that resulted in a manual actuation of the Reactor Protection System (RPS) and an automatic actuation of the Auxiliary Feedwater System which is an Engineered Safety Features System. These two actuations are reportable pursuant to 10CFR50.73(a)(2)(iv).

A definitive root cause for this event could not be identified. However, the apparent cause of the event is an electronic circuit open/fault in the Voltage Regulator Logic Drawer of the Main Unit Generator. There were minimal safety implications to the health and safety of the public.

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PLANT AND SYSTEM IDENTIFICATION

Westinghouse-Pressurized Water Reactor System

Main Generator (TB)

Main Generator Excitation System (TL)

Main Generator Voltage Regulator (TL/RG)

Auxiliary Feedwater System (BA)

CONDITIONS PRIOR TO OCCURRENCE

Unit 1: Mode 1 at 100 % power

There were no systems, structures, or components that were inoperable that contributed to the event.

DESCRIPTION OF EVENT

On September 6, 1999 with the Beaver Valley Power Station (BVPS) Unit No.

1 running at 100% power, the following four alarms were received at 1722:

Generator Field Forcing, Generator Field Overcurrent, Voltage Regulator Firing Circuit #1 Blown Fuse/Power Loss, and Voltage Regulator Firing Circuit #2 Blown Fuse/Power Loss. No activities were ongoing involving the Main Unit Generator (MUG). Control room operators observed the main generator power factor, VAR and current meters to be fluctuating rapidly above and below normal values. The above four alarms then cleared and reoccurred within approximately two seconds. These alarms continued to clear and reoccur on an approximate two second frequency. The reactor was manually tripped 18 seconds after the receipt of the initial alarm.

The sequence of event recorder output from the plant computer showed that the four alarms described above occurred eight times before the plant was tripped. Subsequent analysis of these initial conditions indicate that the field of the MUG was fluctuating above the field forcing setpoint of 102% or 114 amps field current for approximately one second. The field current also fluctuated above the field overcurrent setpoint of 122 amps. Control room recorders indicated field current fluctuated between 20 and 142 amps versus its normal value of 90 amps. These conditions did not

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DESCRIPTION OF EVENT (Continued)

initiate automatic equipment protection because the very short duration of the conditions which did not exceed the time delay for any protective setpoints on these parameters.

The control room operators followed station procedures to recover from a

(manual) reactor trip. Safety related systems functioned satisfactorily following the reactor/turbine trip and the Unit was maintained in hot standby conditions. As a result of the manual reactor trip, steam generator water level in the three steam generators dropped below the threshold for automatic actuation of the Auxiliary Feedwater (AFW) System, as expected for any BVPS reactor trip at full power operation, and the AFW System automatically actuated properly approximately five seconds after the manual reactor trip. Operators subsequently returned and maintained normal steam generator water levels using both the AFW and Main Feedwater Systems.

CAUSE OF THE EVENT

The root cause of the observed cyclic field current variations observed in the control room on September 6, 1999 could not be specifically determined. Extensive testing by both utility personnel and vendor representatives identified no problems with the permanent magnet generator (PMG), the main generator, the main generator exciter, and the exciter DC circuit. A degraded condition in the Voltage Regulator Logic Drawer is the most probable cause of this event. The apparent cause of the event is an electronic circuit open/fault.

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REPORTABILITY

The reactor was manually tripped by the control room operator. This is an event that resulted in a manual actuation of the Reactor Protection System (RPS) and is reportable pursuant to 10CFR50.73(a)(2)(iv). As a result of

the manual reactor trip, steam generator water level in the three steam generators dropped below the threshold for automatic actuation of the Auxiliary Feedwater (AFW) System, as expected for any BVPS reactor trip at full power operation, and AFW System automatically actuated properly. Since the AFW System is an Engineered Safety Features System, this event involved an automatic actuation of an ESF and is also reportable pursuant to 10CFR50.73(a)(2)(iv).

SAFETY IMPLICATIONS

The component malfunction occurred spuriously within the Main Unit Generator Voltage Regulator. The plant was then promptly shutdown by a manual reactor trip and maintained in hot standby conditions with safety related systems responding satisfactorily. Post-trip review of the event conducted in accordance with NPDAP 5.11 and by the plant safety committees concluded that the plant responded as expected for a manual reactor trip in accordance with the UFSAR. There were minimal safety implications to the health and safety of the public.

CORRECTIVE ACTIONS

1. The Logic Drawer of the Voltage Regulator for the Main Unit Generator was replaced with a spare and tested to be operating satisfactorily.
 2. Independent failure analysis of the previous Voltage Regulator Logic Drawer is being performed to supplement the root cause evaluation.
- Appropriate corrective actions will be implemented through the corrective action program if this additional evaluation discloses any

new information or conclusions on the Voltage Regulator.

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CORRECTIVE ACTIONS (Continued)

3. As an interim measure, the preventative maintenance procedure for the BVPS MUG Voltage Regulator (1/2PMP-35-EXC-REGULATOR-1E) will be revised to include inspection of the "Fine" compensation potentiometer. The "Fine" compensation potentiometer was observed to exhibit erratic resistance readings because of oxidation/corrosion on the internal contact surfaces during the performance of the MUG Voltage Regulator inspection and testing. This will be complete by December 30, 1999.

4. As a final measure, the Voltage Regulator Panel on the Beaver Valley Power Station Unit No. 1 Main Unit Generator will be upgraded to implement several vendor and System Engineering recommendations. This upgrade will be implemented in the next refueling outage (1R13).

5. As a final measure, the Voltage Regulator Panel on the Beaver Valley Power Station (BVPS) Unit No. 2 Main Unit Generator (MUG) will be upgraded to implement several vendor and System Engineering recommendations. This upgrade will be implemented in the next refueling outage (2R08).

6. The preventative maintenance procedure for the BVPS MUG Voltage Regulator (1/2PMP-35-EXC-REGULATOR-1E) will be revised to allow open loop testing with the Voltage Regulator in "Automatic" in addition to

being in "Manual". This procedure will also be revised to ensure the voltage regulator is in "Manual" prior to Maintenance & Test Equipment (M&TE) removal. This action will be complete by December 30, 1999.

PREVIOUS SIMILAR EVENTS

A review of previous Beaver Valley Power Station Unit 1 and Unit 2 LERs within the last three years identified no LERs involving failure of the Main Unit Generator.

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Nuclear Group

P.O. Box 4

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October 1, 1999

L-99-150

Beaver Valley Power Station, Unit No. 1

Docket No. 50-334

License No. DPR-66

LER 99-010-00

United States Nuclear Regulatory Commission

Document Control Desk

Washington, DC 20555

In accordance with Appendix A, Beaver Valley Technical Specifications, the following Licensee Event Report is submitted:

LER 99-010-00, 10 CFR 50.73(a)(2)(iv), "Beaver Valley Power Station Unit No. 1 Manual Reactor Trip Due to Main Unit Generator Voltage Regulator Malfunction."

/s/

K. L. Ostrowski

Division Vice President

Nuclear Operations and

Plant Manager

Attachment

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NP The Nuclear Professionals

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